

*Amend
B1* with hard palm kernel fraction without having to further undergo fractionation process.

*A
Amend* 11. (Amended) A margarine fat blend made in accordance with claim 10 wherein the hard structural fat is produced by interesterification reaction of hard palm fraction with hard palm kernel fraction such a way that the hard structural fat has a trisaturated triglyceride of H3 type of C 16 and above is less than 25% preferably less than 20%.

REMARKS

The specification and claims have been amended in response to the Examiner's suggestions of pages 3-5 of the Office Action. These objections are believed to have now been overcome.

The present invention is directed to the production of an improved Trans free hard structural fat for margarine blends and spreads. It consists of 60-90% of a liquid oil selected from the group consisting of sunflower oil, canola oil, soy oil, peanut oil, rice bran oil, olive oil, safflower oil, corn oil, or marine oil (or a blend thereof) which is then blended with a Trans free hard structured fat (5-40%). The hard structured fat is made from a selectively fractionated non-hydrogenated palm oil fraction which is interesterified with lauric fat such as a dry fractionated, non-hydrogenated palm kernel fraction without using a hydrogenation process nor an organic solvent or detergent for fractionation (see claim 1 as filed).

The use of conventional separation processes, such as "high pressure membrane type filters" and "melt crystallization" are well known in this art and would not require undue experimentation upon having the present disclosure before one to choose requisite conditions. This is especially so where pressure conditions are set

forth (claim 8) regarding the high pressure membrane filters. Please note that these terms were part of the specification (claims) as filed.

As to the term "interesterification reaction," it denotes the controlled rearrangement of fatty acids between the glycerol molecules of a fat (Grant & Hackh's Chemical Dictionary, 5th Edition, page 219).

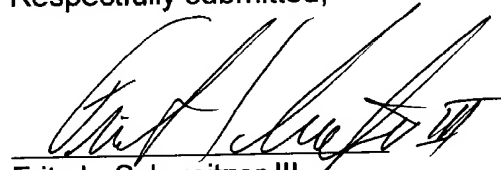
Claims 1-4, 6 and 7 have been rejected over the Arni et al. reference. While the reference teaches the use of a palm oil fraction, it is not a selectively non-hydrogenated palm oil fraction interesterified with lauric fat. Further, the palm oil fraction is not blended with one of the liquid oils (sunflower, corn, soy, peanut, olive, etc.) called for by the present invention to produce the present healthy blended oil spreads.

In view of the above remarks and amendments, favorable reconsideration of this case is respectfully requested.

CUSTOMER NO. 022831

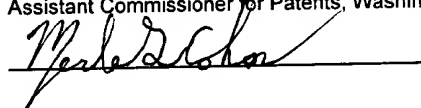
Schweitzer Cornman
Gross & Bondell LLP
292 Madison Avenue, 19th Floor
New York, New York 10017
(646) 424-0770

Respectfully submitted,



Fritz L. Schweitzer III
Attorney for Applicants
Registration No. 39,363

I hereby certify that this correspondence is being deposited with the United States Postal Service
as first class mail in an envelope addressed to:
Assistant Commissioner for Patents, Washington, D.C. 20231, on October 23, 2002



Merle L. Cohn



Patent No. 09/766,158

Marked-Up Claims

1. A margarine blend and spread consisting of 60 - 95% of a liquid oil **[such as]**
selected from the group consisting of sunflower oil, Canola oil, soy oil, pea nut
oil, rice bran oil, olive oil, safflower oil, corn oil or marine oil or the blend of any of
the above liquids **[to be blended]** with a Trans free hard structural fat at 5 -40% level
whereby the said hard structural fat is made from selectively fractionated non-
hydrogenated palm oil fraction, which is interesterified with lauric fat such as dry
fractionated non-hydrogenated palm kernel fraction without using hydrogenation
process and without using organic solvent or detergent for fractionation.
2. A margarine/spread fat blend according to claim 1, where the liquid oil blend has
high **[poly]** **poly**/mono unsaturated level such that in the total fat blend the
poly/mono unsaturation level exceeds 40% **[so that health claim such as high**
poly/mono unsaturated, low saturated fatty acid (SAFA) margarine/spreads
can be made].
3. A **trans free** hard structural fat according to claim 1 is produced without using
hydrogenation process so that Trans fatty acid residue produced during the
hydrogenation is eliminated.
4. A **[hard]** palm fraction according to claim 1 has a C16 carbon chain residue greater
than 70%**[preferably greater than 80% and most preferably greater than 84%]**.
5. A **[hard]** palm fraction according to claim 1 has a melting point higher than 57 Deg
C**[, preferably greater than 60 Deg C]** and can be flaked for easy handling
because of its high melting point in spite of not being required to undergo
hydrogenation and has a solid fat content of > 75% at 40 Deg C **(preferably) > 80%**
solids at 40 Deg C.

6. A process according to claim **[1] 5 [wherein] which comprises selectively dry fractionating** palm fat/ palm oil or its stearin fraction [is selectively dry fractionated] by melt crystallization process to harvest the hard palm fraction with C16 level of > 75%, preferably > 83% with a total unsaturation level of < 15% preferably less than 10%.
7. A process according to claim 6 **[wherein palm fat/ oil is dry fractionated] which comprises dry fractioning palm fat/oil** using two steps melt crystallization process, the first step [is] being performed between 20-25 Deg C, preferably between 22-24 Deg C, to obtain a medium hard palm fraction and the medium hard palm fraction is then once again dry fractionated between 45-55 Deg C, more preferably 49-52 Deg C depending of the iodine number of the first dry fraction, to harvest very hard palm fraction rich in C 16 fatty acids.
8. A process according to claims 1- 7 [6 in] which **comprises separating** the palm fraction in the second fractionation step **[is separated]** in high pressure membrane type filter wherein a pressure of 10-35 bar is used preferably > 20 bar, most preferably > 30 bar is used to inflate the membrane so as to remove the liquid fraction occluded in the **[hard] palm** fat, thus eliminating the requirement of solvent fraction method. **[This does not exclude use of high pressure hydraulic pressing of the cooled slab of palm oil fraction to obtain the same desired hard palm fat suitable for the manufacture of hard structural fat (a labor intensive process).]**
9. A margarine fat blend **[according to] made in accordance with process** claim 1 wherein the hard structural fat is produced by interesterification reaction of hard palm fraction with hard palm kernel fraction, the resultant hard fat is not further fractionated but used as such as a hard structural fat, thus eliminating a further processing which in turn result in high yield of the structural fat at a lower cost.

10. A margarine fat blend **[according to claim 1] made in accordance with claim 9** wherein the hard structural fat- is produced by interesterification reaction of hard palm fraction with hard palm kernel fraction without having to further undergo fractionation process, **[, thus eliminating the disposal problems of byproduct fractions associated with such processing to obtain hard structural fat.]**
11. A margarine fat blend **[according to] made in accordance with claim [1], 10** **[where in] wherein** the hard structural fat is produced by interesterification reaction of hard palm fraction with hard palm kernel fraction such a way that the hard structural fat has a trisaturated triglyceride of H3 type of C 16 and above is less than 25% preferably less than 20%.



TRANS FREE HARD STRUCTURAL FAT FOR MARGARINE BLEND AND SPREADS

[Description:]

[We hereby declare the invention for which we pray that a patent be granted for the product and the process by which it is performed which is particularly described by the following statements:-

The present invention is concerned with a Trans free hard structural fat suitable for the manufacture of low SAFA (Saturated Fatty Acid) poly/mono unsaturated margarine and spreads and fat blends for margarine/spreads using the above mentioned structural fat. This structural fat is made from selectively fractionated non-hydrogenated palm oil fraction, which is interesterified with dry fractionated non-hydrogenated palm kernel fraction to obtain hard structural fat with high yield ratios that can be economically and commercially used as structural fat for the manufacture of Trans free low SAFA, poly unsaturated/mono unsaturated margarine/spreads.]

BACKGROUND OF THE INVENTION

Historically emulsified fat system in margarine/spreads has been designed to satisfy customer requirements such as significant cooling impact, a rapid sharp melt sensation, and **[no] not having a** coated or waxy feel on the tongue. In addition, it should impart temperature cycling stability (heat stability) as well as spreadability when taken out frequently from the refrigerator[s **are the**] **as a** prominent feature[s].

To achieve these objectives, margarine fat blend is being formulated using hard stocks derived by hydrogenation of liquid oils. However, with the adverse effect of Trans fatty acids being published, consumers are looking for margarine / spreads with practically no Trans fatty acids.

BRIEF DESCRIPTION OF THE INVENTION

This can be achieved by using fully hydrogenated fats as structural fat, which usually does not contain Trans fatty acid or very negligible amount.

Hydrogenation [**process is**] **processes are** generally viewed as the main reason for the development of Trans fatty acids in oils and fats. Hence, there is a strong consumer perception against usage of and hydrogenated oil/fat in the food products including margarine / spreads.

[Hence research work is being carried out for developing] **The present invention serves to develop** margarine/spreads using no hydrogenated oils in their hard stock at the same time [**looking at the possibility of reducing**] **serving to reduce** the saturated fatty acid levels (**hereinafter referred to** as SAFA) in the products.

DETAILED DESCRIPTION OF THE INVENTION

The present invention is concerned with a Trans free hard structural fat suitable for the manufacture of low SAFA (Saturated Fatty Acid) poly/mono unsaturated margarine and spreads and fat blends for margarine/spreads using the above mentioned structural fat. This structural fat is made from selectively fractionated non-hydrogenated palm oil fraction, which is interesterified with dry fractionated non-hydrogenated palm kernel fraction to obtain hard structural fat with high yield ratios that can be economically and commercially used as structural fat for the manufacture of Trans free low SAFA, poly unsaturated/mono unsaturated margarine/spreads.

Theoretical Considerations

The hard stock contributes triglycerides especially of the trisaturated type. A certain minimum quantity of these is essential to provide the "structural fat" and to prevent oiling out of the liquid oil. From the patent literature and general experience, this minimum quantity is around 6%. More is acceptable and desirable if the amount of H₃ tri-glycerides, and especially tristearin, is not greater than 2% otherwise poor consumer mouth feel will result. Hence content of H₂M triglycerides is valuable, to give the structuring effect[, h]. **Hence the need for a lauric oil.**

When the hard stock components are interesterified, the amounts of trisaturated triglycerides in the interesterified product are determined entirely by the content of saturated fatty acids in the blend. This relationship is very critical as shown by the results:

% Saturated Fatty Acid in the Oil blend	% Trisaturated Triglycerides After Interesterification
50	13
60	22
70	34
80	51
90	73

Taking sunflower oil as the PUFA oil to be used in the blend, at a level of 80% (SAFA 10.3%) then the hard stock should not contribute more than 11.76% SAFA to the final blend considering that the SAFA content of polyunsaturated margarine should not exceed 20%. If 20% of the hard stock were used for the margarine blend along with Sunflower oil as above (a high usage level) - and if we also want a minimum of 6% trisaturated Tgs in the final blend, it can be seen from the above table that the SAFA content of the hard stock must be about 67% so that interesterified hard stock has 30% trisaturated triglyceride. Assuming only 15% hard stock is used then the SAFA content of the hard stock must be about 74%, so that it has 40% trisaturated triglyceride after interesterification. These are minimum requirements and a higher amount of trisaturated Tgs would be desirable.

The usage of hard structural fat in the blend can be 5 to 25% and the liquid oil or its blends can be 95 - 75%.

By way of summary, a margarine blend and spread consisting of 60 - 95% of a liquid oil such as sunflower oil, Canola oil, soy oil, peanut oil, rice bran oil, olive oil, safflower oil, corn oil or marine oil or a blend of any of the above liquids is blended with a Trans free hard structural fat at 5 -40% level. Said hard structural fat is made from selectively fractionated non-hydrogenated palm oil fraction, which is interesterified with lauric fat such as dry fractionated non-hydrogenated palm kernel fraction without using a hydrogenation process nor using an organic solvent or detergent for fractionation.

The margarine/spread fat blend has a liquid oil blend which preferably has a high poly/mono unsaturated level such that in the total fat blend the poly/mono unsaturation level exceeds 40% to better support health claims (high poly/mono unsaturated, low saturated fatty acid (SAFA) margarine/spreads can be made).

The hard palm fraction has a C16 carbon chain residue greater than 70% preferably greater than 80% and most preferably greater than 84%. The hard palm fraction has a melting point higher than 57 Deg C, preferably greater than 60 Deg C and can be flaked for easy handling because of its high

melting point in spite of not being required to undergo hydrogenation and has
a solid fat content of > 75% at 40 Deg C preferably > 80% solids at 40 Deg C.
The palm fat/ palm oil or its stearin fraction is selectively dry fractionated by
melt crystallization process to harvest the hard palm fraction with C16 level
of > 75%, preferably > 83% with a total unsaturation level of < 15%
preferably less than 10%.

ABSTRACT

A Trans free structural fat suitable as a margarine fat blend for the manufacture of low SAFA (Saturated Fatty Acid) poly/mono unsaturated margarine and spreads and fat blends for margarine/spreads. The structural fat is made from selectively fractionated non-hydrogenated high melting palm oil fraction which is interesterified with dry fractionated non-hydrogenated palm kernel fraction with high yield ratios that can be economically and commercially used as structural fat for the aforesaid manufacture.



TRANS FREE HARD STRUCTURAL FAT FOR MARGARINE BLEND AND SPREADS

BACKGROUND OF THE INVENTION

Historically emulsified fat system in margarine/spreads has been designed to satisfy customer requirements such as significant cooling impact, a rapid sharp melt sensation, and not having a coated or waxy feel on the tongue. In addition, it should impart temperature cycling stability (heat stability) as well as spreadability when taken out frequently from the refrigerator as a prominent feature.

To achieve these objectives, margarine fat blend is being formulated using hard stocks derived by hydrogenation of liquid oils. However, with the adverse effect of Trans fatty acids being published, consumers are looking for margarine / spreads with practically no Trans fatty acids.

BRIEF DESCRIPTION OF THE INVENTION

This can be achieved by using fully hydrogenated fats as structural fat, which usually does not contain Trans fatty acid or very negligible amount.

Hydrogenation processes are generally viewed as the main reason for the development of Trans fatty acids in oils and fats. Hence, there is a strong consumer perception against usage of and hydrogenated oil/fat in the food products including margarine / spreads.

The present invention serves to develop margarine/spreads using no hydrogenated oils in their hard stock at the same time serving to reduce the saturated fatty acid levels (hereinafter referred to as SAFA) in the products.

DETAILED DESCRIPTION OF THE INVENTION

The present invention is concerned with a Trans free hard structural fat suitable for the manufacture of low SAFA (Saturated Fatty Acid) poly/mono unsaturated margarine and spreads and fat blends for margarine/spreads using the above mentioned structural fat. This structural fat is made from selectively fractionated non-hydrogenated palm oil fraction, which is interesterified with dry fractionated non-hydrogenated palm kernel fraction to obtain hard structural fat with high yield

ratios that can be economically and commercially used as structural fat for the manufacture of Trans free low SAFA, poly unsaturated/mono unsaturated margarine/spreads.

Theoretical Considerations

The hard stock contributes triglycerides especially of the trisaturated type. A certain minimum quantity of these is essential to provide the "structural fat" and to prevent oiling out of the liquid oil. From the patent literature and general experience, this minimum quantity is around 6%. More is acceptable and desirable if the amount of H_3 tri-glycerides, and especially tristearin, is not greater than 2% otherwise poor consumer mouth feel will result. Hence content of H_2M triglycerides is valuable, to give the structuring effect. Hence the need for a lauric oil.

When the hard stock components are interesterified, the amounts of trisaturated triglycerides in the interesterified product are determined entirely by the content of saturated fatty acids in the blend. This relationship is very critical as shown by the results:

% Saturated Fatty Acid	% Trisaturated Triglycerides
in the Oil blend	After Interesterification
50	13
60	22
70	34
80	51
90	73

Taking sunflower oil as the PUFA oil to be used in the blend, at a level of 80% (SAFA 10.3%) then the hard stock should not contribute more than 11.76% SAFA to the final blend considering that the SAFA content of polyunsaturated margarine should not exceed 20%. If 20% of the hard stock were used for the margarine blend along with Sunflower oil as above (a high usage level) - and if we also want a minimum of 6% trisaturated Tgs in the final blend, it can be seen from the above table that the SAFA content of the hard stock must be about 67% so that interesterified hard stock has 30% trisaturated triglyceride. Assuming only 15% hard stock is used then the SAFA content of the hard stock must be about 74%, so that it has 40% trisaturated triglyceride after interesterification. These are minimum requirements and a higher amount of trisaturated Tgs would be desirable.

The usage of hard structural fat in the blend can be 5 to 25% and the liquid oil or its blends can be 95 - 75%.

By way of summary, a margarine blend and spread consisting of 60 - 95% of a liquid oil such as sunflower oil, Canola oil, soy oil, peanut oil, rice bran oil, olive oil, safflower oil, corn oil or marine oil or a blend of any of the above liquids is blended with a Trans free hard structural fat at 5 -40% level. Said hard structural fat is made from selectively fractionated non-hydrogenated palm oil fraction, which is interesterified with lauric fat such as dry fractionated non-hydrogenated palm kernel fraction without using a hydrogenation process nor using an organic solvent or detergent for fractionation.

The margarine/spread fat blend has a liquid oil blend which preferably has a high poly/mono unsaturated level such that in the total fat blend the poly/mono unsaturation level exceeds 40% to better support health claims (high poly/mono unsaturated, low saturated fatty acid (SAFA) margarine/spreads can be made).

The hard palm fraction has a C16 carbon chain residue greater than 70% preferably greater than 80% and most preferably greater than 84%. The hard palm fraction has a melting point higher than 57 Deg C, preferably greater than 60 Deg C and can be flaked for easy handling because of its high melting point in spite of not being required to undergo hydrogenation and has a solid fat content of > 75% at 40 Deg C preferably > 80% solids at 40 Deg C. The palm fat/ palm oil or its stearin

fraction is selectively dry fractionated by melt crystallization process to harvest the hard palm fraction with C16 level of $> 75\%$, preferably $> 83\%$ with a total unsaturation level of $< 15\%$ preferably less than 10% .

ABSTRACT

A Trans free structural fat suitable as a margarine fat blend for the manufacture of low SAFA (Saturated Fatty Acid) poly/mono unsaturated margarine and spreads and fat blends for margarine/spreads. The structural fat is made from selectively fractionated non-hydrogenated high melting palm oil fraction which is interesterified with dry fractionated non-hydrogenated palm kernel fraction with high yield ratios that can be economically and commercially used as structural fat for the aforesaid manufacture.